PHILOLOSPHICAL AND INGENIOUS AMUSEMENTS.

A person having fixed on a number in his mind, to tell him what number it is.

BID him quardruple the number thought on, or multiply it by 4; and, having done this, desire him to add 6, 8, 10, or any even number you please, to the product; then let him take the half of this sum, and tell you how much it is; from which, if you take away half the number you desired him at first to add to it, there will remain the double of the number thought on.

EXAMPLE.

Suppose the number thought on is	5
The quadruple of it is	20
8 added to the product is	28
And the half of this sum is	14
4 taken from this leaves	10

therefore 5 was the number thought on.

Another method of discovering a number thought on.

After the person has fixed on a number, bid him double it, and add 4 to that sum; then let him multiply the whole by 5, and to that product add 12; desire him also to multiply this sum by 10; and, after having deducted 302 from the product, to tell you the remainder; from which, if you cut off the last two figures, the number that remains will be that thought on.

EXAMPLE.

Let the number thought on be . .	7
Then the double of this is . . .	14
And 4 added to it makes	18

This multiplied by 5 is 90
And add 12 to it is 102
And this multiplied by 10 is . . . 1020
From which deducting 302
There remains 718

which, by striking off the last two figures, gives 7 the number thought on.

A quantity of eggs being broken, to find how many there were, without remembering the number.

An old woman, carrying eggs to market in a basket, met an unruly fellow, who broke them. Being taken before a magistrate, he was ordered to pay for them, provided the woman could tell how many she had; but she could only remember that, in counting them into the basket by twos, by threes, by fours, by fives, and by sixes, there always remained one; but, in counting them in by sevens, there were none remaining. Now, in this case, how was the number to be ascertained?

This is the same thing as to find a number, which being divided by 2, 3, 4, 5, and 6, there shall remain 1, but being divided by 7, there shall remain nothing; and the least number, which will answer the conditions of the question, is found to be 301, which was, therefore, the number of eggs the old woman had in her basket.

A curious experiment to prove that two and two do not make four.

Take a glass vessel, with a long narrow neck, which, being filled with water, will hold exactly a quart; then put into this vessel a pint of water, and a pint of acid of vitriol, and you will presently perceive, that the mixture will not fill the vessel, as it did when a quart of water only was put into it. The acid of vitriol must be put in gradually, by little and little at a time, mixing each portion with the water before you add more, by shaking the bottle, and leaving the mouth of the bottle open, other-

wise the bottle will burst. The mixture, in this case, also possesses a considerable degree of heat, though the two ingredients, of themselves, are perfectly cold; and this phenomenon is not to be accounted for, by supposing that the acid of vitriol is received in the pores of the water; for, then a small portion of acid might be dissolved in a large portion of water, without augmenting its bulk, which is known not to be the case; but the very form of the bodies in this experiment is changed; there being, as Dr. Hook, who first noticed the fact, observes, an actual penetration of dimensions. Chemistry also furnishes a number of other instances, which show, that two bodies, when mixed together, possess less space than when they are separate.

To make a pen, which holds one hundred sheep, hold double the number, by only adding two hurdles more.

In the first pen, or that which holds one hundred sheep, the hurdles must be so disposed that there shall be only one at the top and bottom, and the rest in equal numbers on each side; then it is obvious, that if one hurdle more be placed at each end, the space enclosed must necessarily be double the former, and consequently will hold twice the number of sheep.

To make a mutual exchange of the liquor in two bottles, without using any other vessel.

Take two bottles, which are nearly as equal as possible, both in neck and belly, and let one be filled with oil, and the other with water; then clap the one that is full of water dexterously upon the other, so that the two necks shall exactly fit each other; and, as the water is heavier than the oil, it will naturally descend into the lower bottle, and make the oil ascend into its place.

In order to invert the bottle of water without spilling the contents, place a bit of thin writing paper over the

mouth of the bottle; and, when you have placed the bottle in the proper position, draw out the paper quickly and steadily.

Thirty soldiers having deserted, so to place them in a ring, that you may save any fifteen you please, and it shall seem the effect of chance.

This recreation is usually proposed thus: Fifteen Christians and fifteen Turks being in a ship at sea, in a violent tempest, it was deemed necessary to throw half the number of persons overboard, in order to disburthen the ship, and save the rest; to effect this, it was agreed to be done by lot, in such a manner, that the persons being placed in a ring, every ninth man should be cast into the sea, till one half of them were thrown overboard. Now the pilot, being a Christian, was desirous of saving those of his persuasion; how ought he, therefore, to dispose the crew, so that the lot might always fall upon the Turks?

This question may be resolved by placing the men according to the number annexed to the vowels in the words of the following verse:

Po-pu-le-am Jir-gam Ma-ter Re-gi-na fe-re-bat.
4 5 2 1 3 1 1 2 2 3 1 2 2 1

From which it appears, that you must place four of those you would save first; then five of those you would punish. After this, two of those to be saved, and one to be punished; and so on. When this is done, you must enter the ring; and, beginning with the first of the four men you intend to save, count on to nine, and turn this man out to be punished; then count on, in like manner, to the next ninth man, and turn him out to be punished; and so on for the rest.

It is reported that Josephus, the author of the Jewish History, escaped the danger of death by means of this problem; for, being governor of Joppa, at the time it was taken by Vespasian, he was obliged to secrete himself with thirty or forty of his soldiers, in a cave, where they

made a firm resolution to perish by famine rather than fall into the hands of the conqueror, but being at length driven to great distress, they would have destroyed each other for sustenance, had not Josephus persuaded them to die by lot; which he so ordered, that all of them were killed except himself and another, whom he might easily destroy or persuade to yield to the Romans.

Three persons having each chosen privately one out of three things, to tell them which they have chosen.

Let the three things, for instance, be a ring, a guinea, and a shilling, and let them be known privately to yourself by the vowels *a*, *e*, *i*; of which the first, *a*, signifies one; the second, *e*, two; and the third, *i*, three.

Then take 24 counters, and give the first person 1, which signifies *a*; the second 2, which represents *e*; and the third 3, which stands for *i*. Then, leaving the other counters upon the table, retire into another room, and bid him who has the ring take as many counters from the table as you gave him; he that has the guinea, twice as many; and he that has the shilling, four times as many.

This being done, consider to whom you gave one counter, to whom two, and to whom three; and, as there were only twenty-four counters at first, there must necessarily remain either 1, 2, 3, 5, 6, 7, on the table; or otherwise they must have failed in observing the directions you gave them.

But if either of these numbers remain, as they ought, the question may be resolved by retaining in your memory the six following words:

Salve certa anima semita vita quies.
1 2 3 5 6 7

As for instance: suppose the number that remained was 5; then the word belonging to it is semita; and, as the vowels in the first two syllables of this word are *e* and *i*, it shews, according to the former directions, that he to whom you gave two counters has the ring, he to whom

you gave three counters the gold, and the other person, of course, the silver, it being the second vowel which represents two, and the third which represents three.

A person having an even number of counters in one hand, and an odd number in the other, to tell in which hand the odd or even number is.

Let the person multiply the number in his right hand by an odd number, and the number in his left hand by an even number, and tell you if the sum of the products added together be odd or even. If it be even, the even number is in the right hand; but, if it be odd, the even number is in the left hand.

EXAMPLE.

1. Number in the right hand	18	In the left	7
Multipliers	3		2
	54		14
	14		
Their sum	68		
2. Number in the right hand	7	In the left	18
Multipliers	3		2
	21		36
	36		
Their sum	57		

To tell, by the dial of a watch, at what hour any person intends to rise.

Let the person set the hand of the dial to any hour he please, and tell you what hour that is; and to the number of that hour you add, in your mind, 12. Then tell him to count privately the number of that amount upon the

dial, beginning with the next hour to that on which he proposes to rise, and counting backwards, first reckoning the number of the hour at which he has placed the hand. An example will make this plain.

Suppose the hour at which he intends to rise be 8, and that he has placed his hand at 5. You add 12 to 5, and tell him to count 17 on the dial; first reckoning 5, the hour at which the index stands, and counting backwards from the hour at which he intends to rise, and the number 17 will necessarily end at 8, which shews that to be the hour he chose.

That the hour, at which the counting ends, must be that on which he proposed to rise, will be evident on a little reflection; for, if he had begun at that hour and counted 12, he would necessarily have come to it again; and, calling the number 17, by adding 5 to it, only serves to disguise the matter, but can make no sort of difference in the counting.

The Magical Century.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be similar. As follows:

11	11	11	11	11	11	11	11	11
1	2	3	4	5	6	7	8	9
—	—	—	—	—	—	—	—	—
11	22	33	44	55	66	77	88	99

Place a parcel of counters on a table, and propose to any one to add, alternately, a certain number of those counters till they amount to a hundred, but never to add more than 10 at one time. You tell him, moreover, that if you stake first he shall never make the even century, but you will. In order to which, you must first stake 1; and, remembering the order of the above series, 11, 22, 33, &c. you constantly add to what he stakes as many as will make one more than the number of that series, that is, as will make 12, 23, 34, &c. till you come to 89; after which, the other party cannot make the century himself, or prevent your making it.

If the other party has no knowledge of numbers, you may stake any other number first, under 10, provided you take care to secure some one of the last terms, as 56, 67, 78, &c.

This recreation may be performed with other numbers; and, in order to succeed, you must divide the number to be obtained by a number that has one digit more than what you can stake each time, and the remainder will be the number you must first stake. Observe that, to be sure of success, there must be always a remainder. Suppose, for example, the number to be obtained is 52, making use of a pack of cards instead of counters, and that you are never to add more than 6; then divide 52 by the next number above 6, that is, by 7, and the remainder, which is 3, will be the number you must stake first; and, whatever the other stakes, you must add as much to it as will make it equal to the number by which you divided, that is, 7. Therefore, if his first stake be 1, you must stake 6, &c.; so that your second stake will make the heap 10, your third stake will make it 17, and so on, till you come to 45; when, as he cannot stake more than 6, you must make the number 52.

In this, as in the former case, if the other person have no knowledge of numbers, you may stake any number first under 7; or you may let him stake first, only taking care to secure either of the numbers 10, 17, 24, 31, &c.; after which, he cannot make 52, if you constantly add as many to his stake as will make it 7.

A person privately fixing on any number, to tell him that number.

After the person has fixed on a number, bid him double it and add 4 to that sum, then multiply the whole by 5; to the product let him add 12, and multiply the amount by 10. From the sum of the whole let him deduct 320, and tell you the remainder; from which, if you cut off the two last figures, the number that remains will be that he fixed on.

EXAMPLE.

Let the number chosen be	7
Which, doubled, is	14
And 4 added to it makes	18
Which, multiplied by 5, gives	90
To which 12 being added, it is	102
That multiplied by 10 makes	1020
From which deducting 320, the remainder is	700
And, by striking off the two cyphers, it becomes the original number	7

To tell the number a person has fixed on, without asking him any questions.

THE person having chose any number, from 1 to 15, he is to add 21 to that number, and triple the amount. Then

1. He is to take the half of that triple, and triple that half.
2. To take the half of the last triple, and triple that half.
3. Take the half of the last triple.
4. Take the half of that half.

In this operation it appears there are four cases or stages where the half is to be taken: the three first are denoted by the one of the eight following Latin words, each word being composed of three syllables, and those that contain the letter *i*, refer to those cases (these cases being different in all the numbers that can be chosen they are thereby distinguished) where the half cannot be taken without a fraction; therefore, in those cases, the person who makes the deduction is to add 1 to the number to be divided. The fourth case shews which of the two numbers annexed to every word has been chosen; for, if the fourth half can be taken, without adding 1, the number chosen is in the first column; but, if not, it is in the second column.

Mi-se-ris	8	0
Ob-tin-git	1	9
Ni-mi-um	2	10

No-ta-ri . . .	3	. . .	11
In-fer-nos . . .	4	. . .	12
Or-di-nes . . .	13	. . .	5
Ti-mi-di . . .	6	. . .	14
Te-ne-ant . . .	15	. . .	7

EXAMPLE.

Suppose the number chose to be . . .	9
To which is to be added	1
	10
Then the triple of that number is . .	30
The half of which is	15
The triple of that must be . . .	45
And the half of that	23
The triple of that half	69
The half of that	35
And the half of that half . . .	18

While the person is performing the operation, you remark, that at the second and third stage he is obliged to add 1. and, consequently, that the word *ob-tin-git*, in the second and third syllables of which is an *i*, denotes that the number must be either 1 or 9; and, by observing that he cannot take the last half without adding 1, you know that it must be the number in the second column. If he should make no addition at any of the four stages, the number he chose must be 15, as that is the only number that has no fraction at either of the divisions.

Any number being named, by adding a figure to that number to make it divisible by nine.

If the number named be, for example, 72,857, you tell him, who names it, to place the number 7 between any two figures of that sum, and it will be divisible by 9. For, by aphorism 9, if any number be multiplied by 9, the sum of the figures of the product will be either 9, or a number divisible by 9. But the sum of the figures named is 29, therefore 7 must be added to it to make it divisible by 9.

You may diversify this recreation by specifying, before the sum is named, the particular place where the figure shall be inserted, to make the number divisible by 9.

A person making choice of several numbers, another shall name him the number by which the sum of those numbers is divisible.

PROVIDE a small bag, divided into two parts: in one part put several tickets, on each of which is written a number divisible by 3, as 6, 9, 15, 36, 63, 120, 213, 309, &c.; and in the other part put tickets marked with the number 3 only. From the first part draw a handful of tickets; and, after shewing them, put them in again: then open the bag, and desire any one to take out as many tickets as he thinks proper. Shut the bag; and, when you open it again, offer the other part to another person, telling him to take out one ticket only; you then pronounce that ticket to contain the number by which the amount of the other numbers is divisible. For, each of those numbers being divisible by 3, their sum also must be divisible by the same number.

To find the difference between two numbers, the greatest of which is unknown.

TAKE as many nines as there are figures in the smallest number, and subtract that sum from the number of nines. Let another person add that difference to the largest number; and, taking away the first figure of the amount, add it to the last figure, and that sum will be the difference of the two numbers.

For example, Matthew, who is 22, tells Henry, who is older, that he can discover the difference of their ages; he therefore privately deducts 22 from 99; and the difference, which is 77, he tells Henry to add to his age, and take the first figure away from the amount, and add it to the last figure, and that last sum will be the difference of their ages. As thus:

The difference between Matthew's age and 99 is -	77
To which Henry adding his age - - - - - - -	35
The sum is - - - - - - - - - - - - - -	112
	12
	1
Then, by taking away the first figure 1, and adding it to the figure 2, the sum is - - - - - - -	13
Which added to Matthew's age - - - - - - -	22
Gives the age of Henry, which is - - - - - -	35

A person choosing any two out of several given numbers; and, after adding them together, striking out one of the figures from the amount, to tell you what that figure was.

Such numbers must be offered as are divisible by 9; and, when any two of them are added together, there must be no cypher in the amount: the figures of that amount, moreover, must make either 9 or 18. Such are the numbers following: 36, 63, 81, 117, 126, 207, 216, 252, 261, 306, 315, 360, and 432.

These numbers must be written on cards; and, when any two of them are added together, if a figure be struck out of the sum, it will be what would make the other figures either 9 or 18. For example: if a person choose 126 and 252, their sum will be 378; from which if he strike out the 7, the remaining figures 3 and 8 will make 11; to which 7 must be added to make 18.

Three dice being thrown on a table, to tell the number of each of them, and the order in which they stand.

Let the person who has thrown the dice double the number of that next his left hand, and add 5 to that sum:

[To be continued.